

Ethylene-induced banana starch degradation mediated by an ethylene signaling component MaEIL2

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Abstract

Starch is the major reserve carbohydrate in nature, which possesses nutritional property and industrial applications. Starch degradation is an important contributor to softening and sweetening of banana fruit, but more details in this process are not fully understood. In this study, the contents of total starch, amylose and amylopectin were gradually decreased during banana fruit ripening, which is in parallel with the increased levels of total soluble sugars. Particularly, reduced sizes and elongated shapes of starch granules, as well as decreased crystallinity were observed as ripening proceeds, which is largely due to the digestion of starch degradation enzymes such as amylase and isoamylase. Importantly, an ethylene signaling component MaEIL2 bound to the promoters of amylase and isoamylase encoding genes *MaAMY3*, *MaISA2* and *MaISA3*, and stimulated their transcription. Overall, these findings reveal that starch-sugar transformation during banana ripening is mediated by enzymatic hydrolysis, and that ethylene signaling component MaEIL2 positively modulates starch breakdown via trans-activation of *MaAMY3*, *MaISA2* and *MaISA3*.